INSTITUTE OF PAPER SCIENCE & TECHNOLOGYMEMORANDUM

To: Recycle PAC Members

From: Sujit Banerjee

Subject: Minutes of the March 2000 PAC Meeting

Date: March 14, 2000

The Recycle PAC coincided with the TAPPI Recycling symposium in Washington, DC, and Ted and I made an additional presentation in Washington on March 5. The regular PAC meeting was held on March 6 (presentation) and March 7 (discussion). Since both the PAC chair and vice-chair were at the TAPPI conference, I coordinated the PAC meeting at IPST, and Tom Toothman of G-P took the minutes. I have incorporated Tom's comments into this report.

Gary Baum presented an overview of the new Portfolio Management Process. Presentations were then made by Ted Heindel on project F00903 (modeling and FXR), by me on project F042 (stickies sensor), and by Howard Corcoran (a Ph.D. student) on stickie detackification with the sparker.

Project F00903
Average PAC scores from 16 responses:

1. Progress on project objectives: 3.7
2. Significance of findings and achievements: 3.7
3. Effectiveness of presentation: 4.2
4. Expected completion: 4 (<2); 11 (2 to 5)

Project recommendation: 1-Complete; 13-Continue; 1-Accelerate; 1-Abstain

The discussion on the second day of the meeting addressed the dual paths of the project and what should be the focus for FY00-01. In general, the PAC likes the dual research paths of flotation modeling and FXR work. However, for the next year, it was suggested, and the group agreed, that the project should focus on model validation in a pilot plant and/or mill, and postpone the staggered tube bank FXR work for 1 year. The initial thrust should be on identifying the technology needed and possible procedures for measuring the various model parameters in a pilot plant or mill setting. A pilot plant setting will be investigated first because a pilot cell will have easier access. Ted will first look at the small Voith cell Yulin Deng used in the spray surfactant work. The PAC also suggested Ted spend some time in Voith's pilot plant in Appleton. For the Fall PAC meeting, Ted should have outlined how various model parameters will be measured with potential problems and adjustments needed for the various measurements. The PAC will then decide if the next validation work should be completed in a pilot plant or at a recycle mill.

Project F042
Average PAC scores from 14 responses:

1. Progress on project objectives: 3.8
2. Significance of findings and achievements: 3.8
3. Effectiveness of presentation: 3.5
4. Expected completion: 12 (<2); 2 (2 to 5)

Project recommendation: 2-Complete; 8-Continue; 2-Accelerate; 1-Abstain

The thrust of the discussion was on extending the sensor to microstickies. The inclusion of the method for measuring microstickies was proposed since most members present agreed that macrostickies are preventable with good screening coupled with proper pulping and supplemental dispersion if needed. We agreed that the reappearance of stickies later in the process is generally attributed to reagglomeration of microstickies. The intent is to measure these stickies and confirm that they are present and can be measured using the TOC unit. Most of the PAC members felt that it would be difficult to sell the sensor to mills if it only handled macrostickies, especially to facilities that already had image-analysis procedures in place. It was decided that the project would conclude the macrostickies work with additional mill samples, and would then move to the determination of microstickies. It was agreed that the additional work would extend the project by about 6 months. The question of patentability was discussed. The PAC felt that the microstickies sensor could be commercially valuable, and we were asked to consider filing a provisional disclosure as soon as feasibility was proven.

Sparks
Two comments were offered: one was to use flat screens instead of the Pulmac to determine how sparking affects screenability; the other was to measure pitch before and after sparking by DSC. A demonstration of the sparker was arranged, but unfortunately a capacitor leaked, and the machine wasn't operational.

New project proposal
I presented a new proposal for dehornification of secondary fiber by radiofrequency. This complements an existing State of Georgia project where increased pulp yield can be obtained by irradiating wood chips soaked in white liquor. The white liquor permeates the relatively impermeable regions in wood under the influence of RF. It was felt that that RF-irradiation might force water into hornified regions and hydrate the fibers. The PAC felt that a one-year screening study was appropriate, to be followed up by a longer project if the results so warranted.

Portfolio management

Dave Orloff discussed how the current projects were scored in the portfolio management process (attached).

Dave Orloff explained that IPST used the Jaakko Poyry model, which uses hypothetical scenarios as a basis for its projections, as an aid for generating data relevant to scoring the current projects for the project selection process.

For project F00903, the PAC suggested that the probability of success in the IPST development section should be changed from 20% to 70% because the project is quite far along and close to the development (pilot) phase. The PAC also suggested that the rewards should reflect a 1% yield improvement (a conservative estimate) if the project is successful. A successful project will also allow a recycle mill to used dirtier (i.e., cheaper) furnish to meet their product specifications and/or allow for product upgrades with their current furnish. If possible, this should also be reflected in the rewards section.

For project F042, the committee recommended that the benefits be normalized to a 1,000 tpd mill. Also, extension of the sensor to microstickies will reduce chemical usage and either lower wastepaper costs, or increase fiber yield.

Next PAC meeting

The next PAC meeting was schedule for September 25 (afternoon) and September 26 (morning). The wet-end PAC will be held on September 26 (afternoon) and September 27 (morning).

Attachments

Portfolio management review for F00903 and F042 for March 2000.
Program review and committee discussion agendas.

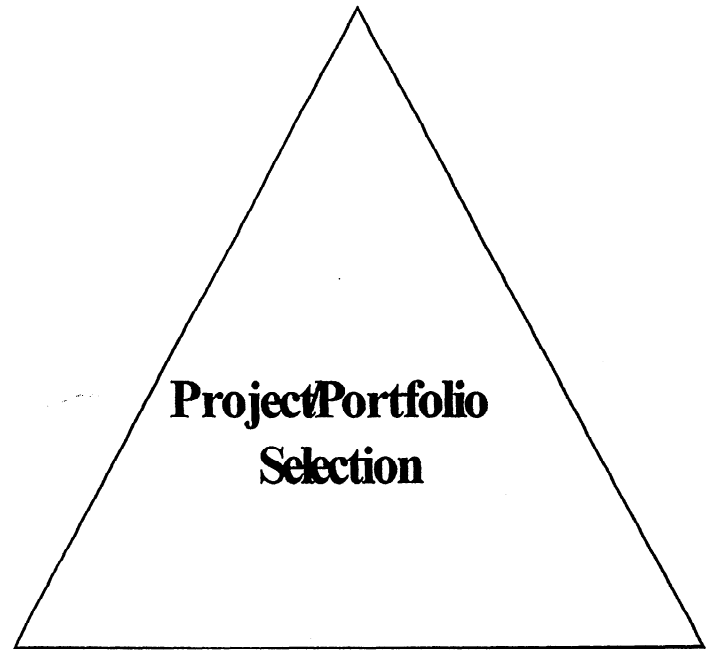
Portfolio Management Review

Recycling

3/00

Our Basic Approach

Alignment with Industry Members' Needs



$ Value to Member Company

Value of Using IPST for this Project

1. ALIGNMENT WITH INDUSTRY MEMBERS' NEEDS- SCORE SHEET

Criteria	Weight	Score (Wt X Scoring Value)	Scoring 1	4	7	10
Alignment with Industry Members' Needs						
Total Members Capacity Affected	5		< 10 Million tons	30 Million tons	45 Million tons	> 65 Million tons
Number of Members Able to Incorporate the Results	4		Less than 10%	40%	70%	100%
Competitiveness vs Competing Industries	2		None	Some Advantage vs Competing Materials	Significant Advantage vs Competing Materials	Essential to Survival
Members' Lead Time v Non-Members	3		0-1 Yrs	2 Yrs	3 Yrs.	≥5 Yrs.
Research Line Priority Score	5		11 to 13	8	5	1 to 2
Environ/Health/ Safety Effect	1		Neutral or Slightly Negative	Positions Industry for Future	Leadership for Industry	Compliance
Total for Alignment						

1. ALIGNMENT WITH INDUSTRY MEMBERS' NEEDS - DEFINITIONS

- **5 - Total Members' Capacity Affected:** The annual production tonnage of all IPST member companies where the deliverables of this project could be implemented.
- **4 - Number of Members Able to Incorporate the Results:** The percentage of all IPST member companies that will be able to utilize the deliverables of this project.
- **2 - Competitiveness vs. Competing Industries:** The extent to which use of the deliverables of this project will enable IPST member companies to successfully meet competition from outside the traditional pulp and paper industry.
- **3 - Members' Lead Time Vs. Nonmembers:** The extent to which use of the deliverables of this project will enable IPST member companies to more successfully compete with similar companies that are not members of IPST. (Units: years of lead time vs. nonmembers)
- **5 - Research Line Priority:** The RAC ranking of the relevant research line for this project. Values in the table above are actual priority of the relevant research line. (See table below.)
- **1 - Environmental/ Health/ Safety Effect:** The impact of successful commercial implementation of the deliverables of this project on the ability of a member company to comply with existing or anticipated environmental, health or safety regulations.

2. VALUE OF USING IPST FOR THIS PROJECT – SCORE SHEET

Criteria	Weight	Score (Wt. X Scoring Value)	Scoring 1	4	7	10
Value of Using IPST for this Project						
Fit with Technical Capabilities	4		Totally New to Industry/IPST	Largely Outside IPST Expertise, Help available	Somewhat Outside IPST Expertise	Totally within IPST Expertise
Availability of Non-IPST Tech Providers	2		Many	Three	Up to Two but Loss of Proprietary Position	None
Leverage of Member's Dues	5		No Likely External Funding	Proposal Submitted	Proposal Submitted & Funding Likely	External Funding In-Hand
Student cost share (Ph.D. = 1; M.S. = 0.5)	3		0	1 student	2 students	3 students
Impact on IPST Competencies Avaliable to Members	1		Loss of competency	No change in Competency	New Competency in an Existing Area	New/Enhanced Center of Excellence in a Competence
Technology Transfer Capability	5		No commercialization pathway identified	Commercialization partner needed	Commercialization partner identified	Direct transfer to members possible
Total for Value of Using IPST						

2. VALUE OF USING IPST FOR THIS PROJECT – DEFINITIONS

- **4 - Fit with Technical Capabilities** - Extent to which the expertise and equipment in place at IPST are well matched to the project requirements.
- **2 - Availability of Non-IPST Technology Providers** - Number of qualified alternative organizations available to do this research (at similar cost).
- **5 - Opportunity to Leverage Members' Dues** - Approximate ratio of the project's current development cost (including the externally funded portion) to the cost to be borne by IPST Members.
- **3 - Student Cost Share** - Number of full-time equivalent (FTE) students connected to this project area {1 MS = 0.5 FTE; 1 PhD = 1 FTE). Note: students are not supported by project funds.
- **1 - Impact on Competency of IPST Available to Members** - Impact of this project on IPST's overall value to Members, as indexed by IPST technical competency (ability to do research, not result of the research).
- **5- Technology Transferability** - Ease of achieving technology transfer to Members

3. $ VALUATION OF THE PROJECT

Input Data Needed:

Probability of Success (PS)

- IPST Development. (PS,I) Percent chance that this project will meet its technical goal(s) within its expected lifetime and funding level. (Units: %)
- Readiness Phase. (PS,R) Percent chance that this project will meet its pre-commercialization goals; e.g., if supplier/intermediary, etc. are needed for commercialization. (Units: %)
- Commercialization. (PS,C) Percent chance that this project will meet its commercial goal(s) within its expected lifetime and funding level, as indicated by finding a commercialization partner and working with that partner in the 1st commercial implementation of the technology. (Units: %)
- Overall Probability of Success (PS,Overall) = [(PS, I)/100] x [(PS,R)/100] x [PS,C]

Costs

- IPST Development. Total DFRC expenditure for this project, from now (actually, from next fiscal year, starting 7/1/00) until end of project (Units: $K)
- Readiness. Total costs required in pre-commercialization phase. (Units: $K)
- Commercialization, Non-Capital Costs. Non-capital costs required in the 1st commercial implementation of the technology. ($K)
- Commercialization, Capital Costs. Installed capital expenditures required in the 1st commercial implementation of the technology. (Units: $K) (Note; $1 K is $1,000.)

Time

- IPST Development. Total IPST DFRC time, from now (actually, from beginning of next fiscal year) until end of DFRC project. (Units: yrs)
- Readiness. Total time required for pre-commercialization phase. (Units: yrs)
- Commercialization. Total time required in the commercialization phase, for the 1st commercial implementation of the technology. (Units: yrs)

Rewards

- Capital/Year: reduction in capital expenditures each year, for a 1000 tpd mill. (Units: $K)
- Profits/Year: increase in annual before-tax mill operating profits, not including depreciation, for a 1000 tpd mill . (Units: $K/yr)
- Years: time that the rewards last; default = 8. (Units: yrs)
- Capital Savings: reduction in 1-time capital expenditures, for a 1000 tpd mill. (Units: $K)

KEY RESULT (Spreadsheet Calculation)

$$\text{RATIO, REWARDS:COSTS} = \frac{\text{Expected Value (EV) of Rewards}}{\text{Expected Value (EV) of Cost(s)}}$$

	PROBABILITY OF TECHNICAL SUCCESS			
	Low **10%** **(Probably beyond current science/ technology; approach not yet clear; likely will involve new science / technology)**	**Medium** **30%** ***(Science/technology route/lead not well established; scouting work to be done; experts think this probably can be done with available technology)***	**Moderately High** **50%** ***(Prototype not yet in hand, but good lead within current technology; experts believe this can be done)***	**High** **80%** ***(Prototype (or pilot work) in hand demonstrating all necessary characteristics, but need to optimize performance)***
Key Factors				
Technical "Gap"	Large gulf between current practice and objective; must invent new science	"Order of magnitude" change proposed	Step-change, short of "order of magnitude"	Incremental improvement; more applied focus
Program Complexity	Difficult to define; many hurdles	Easy to define; many hurdles	A challenge, but "do-able"	Straightforward
Science/ Technology Skill Base	Science/ technology new to IPST; (almost) no skills	Some experience, but probably insufficient	Science/ technology selectively practiced in this area @ IPST	Science/ technology widely practiced in this area @ IPST
Availability of People and Facilities	Definite need for appropriate people, facilities; must hire, build	Acknowledged shortage in key areas	Resources are available, but in demand	People/ facilities immediately available
RESULT - PROBABILITY OF TECHNICAL SUCCESS:				

	PROBABILITY OF COMMERCIAL SUCCESS			
	Low 10%	**Medium 30%**	**Moderately High 50%**	**High 80%**
Key Factors				
Competitive Advantage of the Deliverable (Willingness of Customer to Receive Technology)	Me-too or catch-up technology or product; minor cost reduction. Benefits cannot overcome cost to switch to this technology	Benefit seen as marginally great enough to switch in absence of other factors; need must be highlighted for customers - product tailoring required	Clear relationship between product / process and need; benefit perceived to justify implementing this technology	Product/ process immediately responsive to customer need; enabling benefit that opens significant new business opportunities or cost benefit to the customer
Scale-up / Technology Transfer of the Deliverable (Ability of IPST to Deliver the Technology)	Must develop the approach; scale-up considerations not yet addressed	Commercialization pathway and scale-up considerations being formulated but not resolved	Commercialization pathway (e.g., partner) identified and scale-up approach formulated	Straightforward - route already in place; e.g., direct transfer to customer. No history of similar processes facing problems/failure in moving from pilot to commercial scale
RESULT - PROBABILITY OF COMMMERCIAL SUCCESS:				

RECYCLE

ALIGNMENT WITH INDUSTRY MEMBERS' NEEDS

Project		P.I.	Budget Year Cost ($K)	Actual Research Line No.	Research Line Priority	Members Capacity	Members Able to Use	Comp vs Other Industries	Lead Time	Res. Line Priority Score	Environ/ Health/ Safety	Industry Alignment Score
						5	4	2	3	5	1	
F00903	Deinking	Heindel	114	13	10	2	5	4	4	2	4	64
F042	Stickies	Banerjee	97	13	10	2	5	3	6	2	4	68

RECYCLE

VALUE OF USING IPST FOR THIS PROJECT

Project		P.I.	Fit with Tech Capability	Avail of Non IRST Providers	Dues Leverage	Student Cost Share	Impact on IPST Competencies	Tech Transfer	Total IPST Value - Score
			4	2	5	3	1	5	
F00903	Deinking	Heindel	10	7	5	1	4	4	106
F042	Stickies	Banerjee	7	6	4	1	7	4	90

RECYCLE
RATIO OF REWARDS TO COSTS

Project		P.I.	Costs										Rewards							
			IPST Develop			Readiness - Pilot			Commercial (First Member Installation)							One-Time				
			Time In Yrs	Cost ($K)	Prob (%)	Time In Yrs	Cost ($K)	Prob (%)	Time In Yrs	Cost ($K)	Capital ($K)	Prob (%)	Capital/ Yr ($K)	Profit/ Yr ($K)	Years	Capital Savings ($K)				
F00903	Deinking	Heindel	2	228	20	1	200	40	1	100	200	60	0	0	8	1000	175	27	-148	0.2
F042	Stickies	Banerjee	1	97	40	0	0	100	1	100	100	70	0	540	8	0	112	496	384	4.4

RECYCLE
BASIS FOR REWARDS

Project		P.I.	Rewards			
			Capital/Yr ($K)	Profits/ Yr ($K)	One-Time Capital Savings ($K)	
F00903	Delinking	Heindel	0	0	1000	Based on a 1-time capital savings (reward) of $1000 K due to improved flotation efficiency, where the scenario is retrofitting one flotation cell (cost: $200 K). Ted is confirming.
F042	Stickies	Banerjee	0	540	0	Use $5/ton X 300 tpd X 360 d/yr = $540 K/yr; following up.

DUES-FUNDED PROJECT SUMMARY

Project Title:	**FLOTATION DEINKING FLUID MECHANICS**
Project Number:	**F00903**
PAC:	**Recycle PAC**
Project Staff	
Principal Investigator:	**Ted Heindel**
Research Support Staff:	**Adele Garner, Fred Bloom (consultant)**
Proposed FY 00-01Budget:	**$112,000 ($114k Based on PMR)**
Time Allocation:	
Principal Investigator:	**20%**
Research Support Staff:	**50%, 10%**

RESEARCH LINE/ROADMAP: Line 13

Reduce and/or control contaminants (e.g., stickies, dyes, toners) in recycle fiber pulp using break-through technologies to allow the interchange of recycled pulp with virgin pulp of similar fiber makeup at an economical cost.

BENEFIT TO THE INDUSTRY:

A flotation deinking model will allow paper recyclers to (i) predict effects of process changes before expensive system trials are implemented, (ii) predict changes to improve current flotation cell operation, and (iii) predict performance of new flotation cell design. Methods to control bubble size in flotation deinking cells will improve removal efficiency, and they can be applied to other areas in a mill where gases are introduced into a fiber suspension.

PROJECT OBJECTIVE:

The objective of this project is to increase flotation efficiency by maximizing contaminant removal from waste paper while minimizing fiber loss.

PROJECT BACKGROUND:

This project has focused on two parallel research paths. One investigating the development of a flotation deinking model. The other pursuing bubble size measurement and control strategies in a fiber suspension. These two paths are leading us to improve the flotation deinking performance.

GOALS and MILESTONES FOR FY 00-01:

The goals and milestones for the next fiscal year include (i) construction of a cocurrent bubble column section with staggered obstructions, (ii) flow visualization experiments using FXR to quantify air bubble size modifications in the modified flow region, (iii) improvements to P_{asl} and P_{stab} in our flotation model, and (iv) the identification of the required methods and techniques needed to measure the necessary parameters in a mill setting for mill-scale model validation.

SCHEDULE:

Task Descriptions	2000 July-Sept	2000 Oct-Dec	2001 Jan-Mar	2001 Apr-Jun
Modified cocurrent bubble column design and construction	———			
FXR work in the modified bubble column	—	———		
Improvements to P_{asl} and P_{stab}	———	———	———	
Identification of methods and techniques for mill-scale model validation	———	———	———	———

DELIVERABLES:

- A Member Company Report addressing the modifications to the cocurrent bubble column and the resulting changes to the bubble size distribution.
- A Member Company Report summarizing the progress in the flotation modeling efforts.

DUES-FUNDED PROJECT SUMMARY

Project Title:	**On-line Real Time Quantification of Stickie Contaminants**
Project Number:	**F042**
PAC:	**Recycle**
Project Staff	
Principal Investigator:	**Sujit Banerjee**
Co-Investigators:	**Suresh Shrauti**
FY 00-01 Budget:	**$97,000 ($97k Based on PMR)**
Time Allocation:	
Principal Investigator:	**10%**
Co-Investigators:	**60%**
Supporting Research:	
Students:	**Greg Fike, Ph.D.**

RESEARCH LINE/ROADMAP: Line 13. Reduce and/or control contaminants (e.g., stickies, dyes, toners) in recycled fiber pulp using break-through technologies to allow the interchange of recycled pulp with virgin pulp of similar fiber makeup at an economical cost.

BENEFIT TO THE INDUSTRY: The stickies sensor will allow chemicals costs to be reduced by allowing the amount of chemicals to be matched to the level of stickies present. Also, downtime will decrease and product quality will improve.

PROJECT BACKGROUND: The objective of the project is to develop an online sensor for the quantitation of stickies.

GOALS FOR FY 00-01: Complete laboratory development of the sensor and initiate mill trials.

MILESTONES and SCHEDULE: Complete laboratory development of a unit (Dec 00). Run two mill trials (June 01).

DELIVERABLES:
Establish first-cut feasibility: Dec 99 (complete)
Test the elements of the sensor: June 00
Build and lab-test a complete device: December 00
Complete two mill trials: June 01

RECYCLE
PROJECT ADVISORY COMMITTEE MEETING

March 6, 2000

Institute of Paper Science and Technology
Atlanta, Georgia

PROGRAM REVIEW AGENDA

Seminar Room

7:30 a.m.	Coffee/Danish	
8:00 a.m. - 8:10 a.m.	Opening Remarks Review of Antitrust Statement and Confidentiality Statement	Danny Haynes
8:10 a.m. - 8:30 a.m.	Welcome from Vice President of Research	Gary Baum
8:30 a.m. - 8:40 a.m.	Overview of IPST Recycle Research	Sujit Banerjee
8:40 a.m. – 9:30 a.m.	Project F00903 Flotation Deinking Fluid Mechanics	Ted Heindel
9:30 a.m. - 9:45 a.m.	Break	
9:45 a.m. – 10:15 a.m.	Project F042 OnLine Stickies Sensor	Sujit Banerjee
10:15 a.m. - 11:00 a.m.	Spark Technology for Stickies Detackification	Howard Corcoran
11:00 a.m. – 12:00 p.m.	Demonstration of Spark Technology	
12:00 p.m	Adjourn	

Note: Lunch is provided at 12:00 p.m. in cafeteria.
Dinner is provided at 5:30 p.m.

RECYCLE
PROJECT ADVISORY COMMITTEE MEETING

March 7, 2000

Institute of Paper Science and Technology
Atlanta, Georgia

COMMITTEE DISCUSSIONS AGENDA

Room 173

7:30 a.m.	Coffee/Danish	
8:00 a.m. - 8:10 a.m.	Convene Antitrust Statement Confidentiality Statement New Members Acceptance of Fall, 1999 Minutes Review of Agenda	Danny Haynes
8:10 a.m. – 8:40 a.m.	Portfolio Management/Research Lines	David Orloff
8:40 a.m. – 9:40 a.m.	Committee Discussion of Flotation Deinking Project	Committee
9:40 a.m. – 10:00 a.m.	Break	
10:00 a.m. – 11:00 a.m.	Committee Discussion of Stickies Sensor Project	Committee
11:00 a.m. – 11:30 a.m.	Discussion of New Project Areas	Committee
11:30 a.m.	Final Discussion/Adjourn	

Note: Lunch is provided at 11:30 a.m. in cafeteria.